THE SCIENTIFIC REVOLUTION AND GLOBAL IMPACT

During the seventeenth century, major scientific discoveries occurred in Western Europe, along with increasingly precise statements of the general scientific method. Western science built on earlier contacts, particularly with Arab science, but now it pressed further. Some discoveries provided Europeans with an understanding scientists in other societies had assumed for some time—for example, that the earth is not the center of the universe. Others provided brand new knowledge. Along with the specific findings came an excitement about science, a belief (among some) that science should serve as the centerpiece for all knowledge—and these features had never before developed in any culture, despite important scientific traditions dating back many centuries.

The scientific revolution, and the disputes it roused, particularly with religious authorities, quickly had major impact within Europe. Religion declined, though it hardly disappeared. Scientific approaches began to be applied to social topics, as well as topics in the physical universe. New relationships between science and technological innovation began to develop. Much of this extension occurred during the eighteenth century, in the Enlightenment.

Ultimately, Western science would spread widely, and indeed many societies would begin to contribute to modern scientific work. During the early modern period, however, reactions were somewhat more mixed and tentative. The Ottoman Empire, for example, with a proud scientific tradition of its own, hesitated to import much Western science. Japan, fairly isolated culturally during the seventeenth century, began to allow translations of Western scientific work after about 1720; the Japanese encountered this work through their trading contacts with the Dutch. China, again with an important scientific tradition of its own, maintained some contact with Western discoveries but would not begin to incorporate them thoroughly until the late nineteenth century. Russia (see chapter 19) by the eighteenth century tried actively to import new kinds of scientific training.

The documents that follow highlight some of the key features of the scientific revolution itself. They also allow consideration of several different reactions, where comparison becomes essential. They help explain why the new science, though Western in origin, would ultimately spur global changes in intellectual life and in education.

ISSUE 17

Was the Scientific Revolution Revolutionary?

YES: Edward Grant, from "When Did Modern Science Begin?" *American Scholar* (Winter 1997)

NO: Steven Shapin, from *The Scientific Revolution* (University of Chicago Press, 1996)

ISSUE SUMMARY

YES: Distinguished professor emeritus of history and philosophy of science Edward Grant argues that there was a revolution in science that took place in the seventeenth century; however, it might have been delayed by centuries if several key developments between 1175 and 1500 had not paved the way for it.

NO: Professor of sociology and historian of science Steven Shapin questions the idea of a Scientific Revolution, suggesting greater continuity with the past and rejecting a single time/space event we might call a Scientific Revolution.

When you open a history textbook, you will find it conveniently divided into chapters and units with titles that mark the major turning points of history. One of those titles in a text on World History or Western Civilization is likely to be The Scientific Revolution. Known as periodization, this tendency of historians to provide interpretive groupings of events has recently been subjected to reappraisal. If "where you stand determines what you see," then the very act of labeling periods of history makes judgments about what is important and valuable.

The assumption behind periodization is that there are moments when the path of history is re-routed, when a sharp break with the past leads to a new kind of experience or a new way of understanding the world. One of the questions historians must ask, therefore, is whether a particular event or series of events represents primarily continuity with the past or discontinuity from it. Traditional periodization has seen the Scientific Revolution as a classic example of discontinuity—as a sharp break with the medieval past and the ushering in of the modern world. Recently, however, historians have taken a fresh look at the late sixteenth and early seventeenth centuries and wondered how scientific and how revolutionary this period actually was.

A danger historians must also remain alert to is called presentism, the tendency to judge and interpret the past by the standards and concerns of the present. From the perspective of the early twenty-first century, for example, we might be tempted to emphasize progress, as the Industrial Revolution replaced backbreaking labor with the power of machines. People who actually lived through these changes, by contrast, might have focused on the breakup of the productive family unit in the home, as individuals left the home to do wage work. Two questions we must ask ourselves are: Did Europeans living in the seventeenth century experience revolutionary changes? and How much of a break with the past did the scientific discoveries of that century represent?

For Edward Grant, there was undoubtedly a Scientific Revolution. He sees the fields of astronomy, cosmology, and physics undergoing "momentous changes" over the sixteenth and seventeenth centuries. However, he also documents a series of events—the translation of Greek and Arabic scientific/philosophical works into Latin, the formation of the medieval university, and the emergence of a class of theologian/natural philosophers—without which the Scientific Revolution would not have occurred when it did.

Steven Shapin begins with a boldly revisionist declaration: "There was no such thing as the Scientific Revolution." Reflecting a postmodern view of the world, Shapin questions whether or not it is even possible to speak about an "essence" of something called "science." Instead of a single, discrete entity, he sees a wide variety of ways of understanding, explaining, and controlling the natural world. If we list the characteristics of the so-called revolution, Shapin believes we will find that experimental method, mathematical approaches, and even mechanical conceptions of nature were both advocated and rejected by people who thought of themselves as scientists.

Both Grant and Shapin acknowledge continuity with the medieval past rather than a radical break from it. And, both would agree that the past did not become the "modern world" at a single historical moment. Where they differ, is that Grant does see a seventeenth-century turning point—although rooted in a steady forward progression—whereas, Shapin insists that every development we might label revolutionary had "significantly variant contemporary forms" or was criticized by contemporaries whom we also regard as revolutionary "moderns."